**IN THE CLAIMS**:

1. (Cancelled)

2. (Currently Amended) A communication system as recited in claim [[1]] 33 wherein said transmitter includes an ~~, comprising the~~ encoder ~~for error correcting codes to add redundancy to the information bits by applying turbo code, convolutional code, block code, or low density parity check code to combat the~~ to reduce distortion caused by said power amplifier ~~amplifiers~~ and ~~RF circuits or the~~ said channel ~~and to overcome the noise in the channel~~.

3. (Cancelled)

4. (Currently Amended) A communication system as recited in claim [[3]] 33, wherein said modulator constructs the modulated signal ~~waveforms~~ in orthogonal channels using first and second finite impulse response filters.

5. (Currently Amended) A communication system as recited in claim 4, wherein said first and second finite impulse response filters apply ~~modulator uses~~ pulse shaping functions to the input data stream to create the modulated signal ~~including but not limited to the square-root raised cosine function, raised cosine function, and functions of Hanning, Hamming and Blackman~~.

6. (Currently Amended) A communication system as recited in claim 5, wherein said modulator constructs the ~~linearly~~ modulated signal ~~waveforms~~ of phase shift keying having a variable ~~which do not have constant~~ envelope in the orthogonal channels.

7. (Currently Amended) A communication system as recited in claim [[6]] 35, wherein said amplifier ~~modulator generates waveforms to minimize the distortion after being amplified by power amplifiers of~~ includes class-F, class-E, class-D, class-C amplifiers, and ~~, or power amplifiers of~~ class-A, class-B, class-AB amplifiers working in the saturation region.

8. (Cancelled).

9. (Cancelled).

10. (Cancelled).

11. (Currently Amended) A communication system as recited in claim [[1]] 33, comprising an antenna ~~or multiple antenna~~ for transmission and reception of the amplified modulated signal.

12. (Currently Amended) A communication system as recited in claim [[1]] 11 wherein said receiver includes~~, comprising~~ a down-converter to convert the received signal to a baseband.

13. (Currently Amended) A communication system as recited in claim [[1]] 12 wherein said receiver includes a~~, comprising the~~ sampling circuit to sample the amplified modulated ~~received~~ signal.

14. (Currently Amended) A communication system as recited in claim [[1]] 6 wherein said receiver includes~~, comprising~~ filters ~~in the receiver which are~~ matched to said first and second finite impulse response ~~the shaping~~ filters in said ~~the~~ transmitter~~or to the convolution of the impulses response functions of the shaping filter and the power amplifiers and the RF circuits in the transmitter~~.

15. (Currently Amended) A communication system as recited in claim [[1]] 35 wherein said receiver includes ~~, comprising~~ correlators to correlate the amplified modulated ~~received~~ signal in orthogonal channels with [[the]] prestored waveforms or signals, said correlators create an output signal from the amplified modulated signal.

16. (Currently Amended) A communication system as recited in claim [[1]] 15 wherein said receiver includes ~~, comprising~~ a signal detector ~~which uses the output signals of the correlators~~ to detect the input data stream ~~signal or packet~~ from the output signal.

17. (Currently Amended) A communication system as recited in claim [[1]] 16 including~~, comprising~~ a parameter estimator ~~estimators~~ to estimate [[the]] carrier frequency, phase and symbol timing, using the output signal of said correlators.

18. (Currently Amended) A communication system as recited in claim [[1]] 17 including~~, comprising~~ a tracking loop which uses the ~~estimated~~ carrier frequency, phase and

symbol timing estimated by said parameter estimator ~~in the initialization of the loop~~ to track the input data stream ~~signal~~.

19. (Currently Amended) A communication system as recited in claim [[1]] 18 wherein said receiver includes~~, comprising~~ a decoder ~~which can be the iterative decoder, the maximum likelihood decoder or the block decoder~~.

20. (Currently Amended) A communication system as recited in claim 19, wherein said decoder overcomes the distortion caused by said transmitter and said channel using a ~~power amplifiers or up-converters or RF circuits in the transmitter or by the channel and combats the noise in the channel, the~~ decoding algorithm is optimal to [[the]] noise distribution.

21. (Cancelled).

22. (Currently Amended) A method of minimizing the distortion caused by ~~at least one~~ a saturated power amplifier or up-converter or RF circuit to phase modulated signals, the method comprising ~~of~~ the steps of:

mapping k bits $d=(d_1,d_2, \ldots ,d_k)$ at a time to one of $M=2^k$ phases, the mapped phase is $\varphi(d)$, which is a symbol;

feeding ~~the~~ a coefficient cos $\varphi(d)$ to a first finite impulse response filter for summing a series of the delayed filter coefficients $\{p(j)\}$ weighted by the symbol coefficients $\{\cos \varphi(d)\}$ to form ~~the~~ a filtered in-phase signal; and

feeding ~~the~~ a coefficient sin $\varphi(d)$ to a second finite impulse response filter for summing a series of the delayed filter coefficients $\{p(j)\}$ weighted by the symbol coefficients $\{\sin \varphi(d)\}$ to form ~~the~~ a filtered quadrature signal, wherein the filtering of the in-phase signal and the quadrature signal with a pulse shaping function p(t) of $L \geq 2$ symbols long, and the pulse shaping function is preferred to satisfy:

$$x(t = kT_s) = \begin{cases} 1 & If\ k = L \\ 0 & Else \end{cases}$$

where $x(t)$ is the convolution of $p(t)$ and $p(LT_s-t)$, $T_s$ is the symbol time; when the impulse response $p_1$ $(t)$ of the saturated ratio is known to the designer, the function $x(t)$ is the convolution of $g(t)=p(t)*p_1(t)$ and $g(T-t)$, where T is the duration of $g(t)$.

23. (Cancelled).

24. (Currently Amended) A method ~~Two pulse shaping filters~~ as recited in claim 22, including the step of using a function in a class including a ~~the impulse response function of each filter is any of the~~ square-root raised cosine function with the roll-off factor β in a range between 0.6 and 1.0, inclusive, ~~close to 1.0, the window functions of~~ a Hanning function, a Hamming function, and a Blackman function~~, or any function satisfying the condition in claim 23~~.

25. (Currently Amended) A method ~~modulator implementing phase shift keying~~ as recited in claim 24 [[22]], wherein an [[the]] envelope of the modulated signal varies ~~is not constant~~.

26. (Currently Amended) A [[The]] method as recited in Claim 22 further including the step of ~~comprising at least one pulse shaping filter~~ minimizing power spectral sidelobe regrowth in the presence of distortion caused by RF circuits ~~including any of saturated power amplifier or up-converter or mixer or RF circuit for communications systems or radar employing phase shift keying~~.

27. (Currently Amended) The system as recited in Claim [[1]] 11 further comprising a demodulator to demodulate the amplified modulated ~~received~~ signal in the presence of both distortion and noise, the demodulator comprising:

a first down-converter to convert the received signal in the in-phase channel to baseband;

a second down-converter to convert the received signal in the quadrature channel to baseband;

a sampling circuit to sample the baseband signals in both the in-phase channel and the quadrature channel;

an analog-to-digital converter to convert the sampled baseband signals to digital signals;

a first finite impulse response filter matched to the shaping filter for the in-phase channel in the transmitter, the filter performs low-pass filtering for the samples in the in-phase channel;

a second finite impulse response filter matched to the shaping filter for the quadrature channel in the transmitter, the filter performs low-pass filtering for the samples in the quadrature channel;

a signal detector to detect the incoming signal using the matched filter output; a parameter estimator to estimate the symbol timing, carrier frequency offset and carrier phase using the matched filter output;

a tracking loop to track the carrier frequency, carrier phase and the symbol timing; and

a decoder to make decisions on the received symbols using the tracking loop output.

28. (Cancelled).

29. (Cancelled).

30. (Cancelled).

31. (Cancelled).

32. (Cancelled).

33. (New) A communication system for transmitting and receiving an input data stream, said communication system comprising:

a transmitter for receiving the input data stream and transmitting the input data stream out therefrom, said transmitter including a modulator defining a pulse shaping function for mapping the input data stream using phase shift keying to create a modulated signal, and an amplifier working in a saturation region and defining an impulse response function for amplifying the modulated signal to create an amplified modulated signal, wherein said pulse shaping function and said impulse response function are convoluted;

a channel through which the amplified modulated signal is transmitted; and

a receiver to receive the amplified modulated signal to down convert the amplified signal to retrieve the input data stream therefrom.

34. (New) A communication system as recited in claim 5, wherein said first and second finite impulse response filters define a square root raised cosine function having a roll-off factor (β) in a range between 0.6 and 1.0, inclusive.

35. (New) A communication system as recited in claim 34 wherein said square root raised cosine function defines a duration of symbols (L) in the range between 2 and 6, inclusive.

36. (New) A transmitter for receiving an input data stream and transmitting the input data stream out therefrom, said transmitter comprising:

a modulator defining a pulse shaping function for mapping the input data stream using phase shift keying to create a modulated signal, said modulator including first and second finite impulse response filters to construct the modulated signal in orthogonal channels, wherein said first and second finite impulse response filters define a roll-off factor (β) in a range between 0.6 and 1.0, inclusive, for a square root raised cosine function; and

an amplifier defining an impulse response function for amplifying the modulated signal to create an amplified modulated signal, wherein said pulse shaping function and said impulse response function are convoluted to minimize the effect of noise and distortion allowing the input data stream to be demodulated and read.

37. (New) A method for phase shift keying communications systems for use with nonlinear power amplifiers and linear power amplifiers working in saturation region to achieve bit error performance compatible to bit error rate of phase shift keying communications system using linear power amplifier, the method comprising of the steps of:

generating a phase shift keying signal using square root raised cosine function with roll-off factor in a range between 0.6 and 1.0 as pulse shaping function $p(t)$ to create a modulated signal;

amplifying the modulated signal to create an amplified modulated signal by a nonlinear power amplifier or a linear power amplifier working in saturation region with impulse response function $p_1(t)$, the pulse shaping function and the impulse response function satisfying:

$$x(t = kT_s) = \begin{cases} 1 \;\; If\ k = L \\ 0 \;\; Else \end{cases}$$

where the function x(t) is the convolution of $g(t)=p(t)*p_1(t)$ and g(T-t), where T is the duration of g(t);

filtering the modulated amplified signal in the in-phase channel by a finite impulse response filter matched to the convolution of the said pulse shaping function and the said impulse response function;

filtering the modulated amplified signal in the quadrature channel by a finite impulse response filter matched to the convolution of the said pulse shaping function and the said impulse response function; and

using the output signals of the said finite impulse response filters to retrieve the information data stream.